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WORKING PLAN

YH004397

FOR THE

FORESTS

OF THE

BANJAR VALLEY RESERVE

South—MANDLA FOREST DIVISION, NORTHERN CIRCLE, CENTRAL PROVINCES,

FOR THE PERIOD

1904-1935.

BY

A. A. DUNBAR BRANDER, Esq.,
Offg. Deputy Conservator of Forests.

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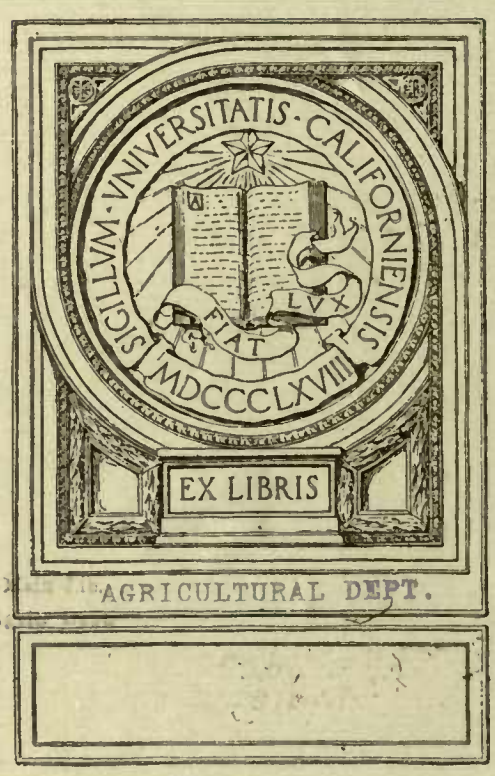
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Central Provinces, India. Forest dept.

CENTRAL PROVINCES ADMINISTRATION.

Revenue Department.

No. 7495.

Nagpur, the 20th November 1905.

READ —

Working Plan Report for the forests of the Banjar Valley Reserve in the Mandla Forest Division.

READ ALSO —

Letter No. 818-W. P., dated the 12th August 1905, from the Inspector-General of Forests, and enclosures.

RESOLUTION.

The plan has the approval of the Inspector-General of Forests and calls for no special remarks. The Chief Commissioner sanctions its introduction with retrospective effect from the 1st July 1904.

ORDER—Ordered that a copy of this Resolution be forwarded to the Government of India, in the Department of Revenue and Agriculture, for information and transmission to the Inspector-General of Forests and to the officers noted on the margin.

Conservator of Forests, Northern Circle; Commissioner, Jubbulpore Division; Deputy Commissioner, Mandla; and the Reporter on Economic Products to the Government of India.

E. H. BLAKESLEY,

Chief Secretary to the Chief Commissioner,

Central Provinces.

Sectt. Press, Nagpur:—No, 1603 R.D.—21-11-05.—120.

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No. 818-W. P., dated Simla, the 12th August 1905.

From—S. EARDLEY WILMOT, Esq., Inspector-General of Forests to the Government of India,

To—The Hon'ble the Chief Commissioner of the Central Provinces.

In accordance with Article 88 (i) of the Forest Department Code, I have the honour to forward for your orders a working-plan for the forests of the Banjar Valley Reserve, Mandla Forest Division, drawn up by Mr. A. A. Dunbar Brander, Officiating Deputy Conservator of Forests, and received with the Conservator's letter No. 2994, dated the 14th June last, a copy of which is enclosed.

2. The plan meets with my approval, and I recommend its adoption with retrospective effect from the 1st July 1904, the date from which fellings were prescribed to begin. I would point out that the data on which the possibility is based are apparently far from reliable, and that if in practice it is proved that this is the case, it would be in the end both cheaper and more satisfactory if the entire area were enumerated for Sal trees of the I and II classes and the felling scheme revised in accordance with the results obtained.

No. 2994, dated Jubbulpore, the 14th June 1905.

From—The Conservator of Forests, Northern Circle, Central Provinces,

To—The Inspector-General of Forests, Simla.

With reference to correspondence resting with your letter No. 205-W. P., dated the th October 1904, and in accordance with Article 88 (l) of the Forest Department Code, I have the honour to submit, herewith, in duplicate, for your approval and transmission to the Honourable the Chief Commissioner, the working-plan, finally printed off, for the forests of the Banjar Valley Reserve in the Mandla Forest Division.

2. I also append a skeleton map on the scale of inch = 1 mile prepared from the original survey sheets submitted.

3. A copy of my letter forwarding a draft Working-Plan Report to the Commissioner, Jubbulpore Division, as well as a copy of his letter in reply is also enclosed.

4. If approved I would request that the provisions of the working-plan may be sanctioned with retrospective effect so as to include the year 1904-05, the first year for which fellings are prescribed.

No. 7239, dated Jubbulpore, the 20th October 1904.

From—A. F. GRADON, Esq., Conservator of Forests, Northern Circle, Central Provinces,

To—The Commissioner, Jubbulpore Division.

Through Deputy Commissioner, Mandla.

I have the honour to forward for your perusal a draft Working-Plan Report for the working of the Banjar Reserve, Mandla Division, drawn up by Mr. A. A. Dunbar Brander, Officiating Deputy Conservator of Forests, Chanda Division, Southern Circle.

I trust an early return of the draft with your approval will be possible.

No. 951, dated the 6th February 1905.

From—M. W. FOX-STRANGWAYS, Esq., I. C. S., Commissioner, Jubbulpore Division.

To—The Conservator of Forests, Northern Circle, Central Provinces.

I have the honour to return the draft Working-Plan Report for the Banjar Reserve forwarded with your letter No. 7239, dated the 20th October 1904, and to express my approval of its provisions. I regret the delay which has occurred, but the report which had been referred back to the Deputy Commissioner by my predecessor reached me only on the 18th January after which a further reference had to be made.

CALIFORNIA

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PART I.

SUMMARY OF FACTS ON WHICH THE PROPOSALS ARE BASED.

CHAPTER I.

Description of the Tracts dealt with.

Name and situation.

1. The forest with which this Working Plan deals forms part of the Banjar Range and is called the Banjar Valley Reserve ; it is situated in the southern part of the Mandla district and lies on the 22° N. latitude and 80° longitude. The forest is 34 miles from Nainpur, the nearest Railway Station on the Bengal-Nagpur line, and is about the same distance from Mandla, the headquarters of the district.

Configuration of the ground.

2. The ground varies in elevation from about 1,700 to 2,800 feet, and, as will be afterwards pointed out, these differences in elevation have a marked effect on the nature of the growing stock.

The configuration of the ground is essentially hilly. Broadly speaking, the area is surrounded by a line of steep and rugged hills rising to an elevation of 600 feet above the enclosed plains, the interior being composed of less conspicuous hills, and in many parts of more or less even ground.

The hills comprise a part of the Maikal Range. Many of the larger hills are characterised by having flat tops of some extent known locally as " Dadars."

The gradient of the hills is steep, the surrounding country slopes gradually up to the base of the hills, which are well marked. The drainage is good throughout, the whole area being much cut up by streams. The most important of these are the Sulkum and the Ghangar, both of which contain abundant water throughout the year.

The larger portion of the area eventually drains into the Banjar River ; only a small portion on the east of the forest drains into the Halon River.

Underlying rock and soil.

3. The forest is situated in the Deccan Trap area. An extraordinary mixture of different rocks is met with ; gneiss conglomerate, trap, limestone, clay, laterite and shale being found in close proximity. The soil derived from these rocks is generally good and favourable to forest growth consisting of a sandy loam, of good depth, frequently reddish in colour. In the low-lying portions there is an admixture of black soil. On the tops and slopes of the higher hills the soil is shallow, large masses of naked rock being often exposed.

Iron is often met with in scattered lumps. Mica is exceedingly abundant everywhere and is present in the water in minute particles.

Climate.

4. The year may be divided into three seasons, the cold, the hot and the rainy seasons. The cold season commences about the middle of October and gradually merges into the hot season about the middle of March. The temperature varies from 70° in the day time to 5° below freezing point at night, and as the range of temperature is both great and rapid, the cold is much felt and causes great damage to trees in low-lying parts and hollows.

The hot season terminates on the bursting of the monsoon, which takes place about the end of June.

Severe hailstorms not infrequently pass over the country in April and do much damage to sal foliage.

The hot season temperature goes up to 100° in the shade during the day, but owing to the masses of vegetation, and the high altitude, the heat is never excessive and the nights are always cool.

The rainy season lies between the hot and the cold seasons. The rainfall varies from 50 inches to 60 inches, most of which falls in July, August and September.

The hot weather months are the healthy months, the rainy and cold months being correspondingly unhealthy. Fever is very prevalent in the rains, while fever and lung complaints are common in the cold weather.

Effects of the climate during the sleeper works of 1901—1903.

5. In the event of, at any future date, works of similar nature to the sleeper works of 1901—1903 being undertaken, the following facts may prove useful :—

Men imported from outside the district suffer more from fever than local villagers. If men are imported in any numbers the following percentages may be written off as unfit for work :—

November December January February	22%	March April May June	17%	July August September October	35%

Owing to the presence of minute particles of mica in the water, workmen suffer much from bowel complaints and skin irritation. During the cold weather months the forests are infested with ticks whose bites cause great itchiness and frequently run to sores.

Agricultural customs and wants of the surrounding population.

6. The surrounding villages are small, and chiefly inhabited by Gonds and Baigas. The cultivators' requirements are small, being limited to a certain amount of wood and bamboos for burning, building, agricultural implements and fencing. There is also a demand for grazing during the rains, when crops and flooded rivers limit the village grazing grounds. Nistar paidawar and grazing are permitted under the commutation system which is discussed in Chapter IX of this Working Plan.

The agricultural methods and customs of the Gonds and other cultivators surrounding the forest are those common to tribes similarly situated elsewhere in the Central Provinces and need not be described in detail here. It will not be out of place, however, to describe more fully the customs of the surrounding population of Baigas, who look upon the forest as their primary source of subsistence, and consequently have a considerable effect on the forest growth.

Customs of the Baigas.

7. Nearly every village adjoining the forest has a population of Baigas attached to it who subsist in a precarious way by doing work for the cultivators especially, as regards supplying them with forest produce. These Baigas forebears had been in the habit of practising "shifting cultivation" locally termed "Bewar", in what at present constitutes reserved forest, and it is to them we owe the large blanks which are found in the Sal forest, such as Parsa, Tola, Kopedabra, Kanha, &c. In these places the Baigas had apparently made more or less permanent settlements, but owing to the severe famine of 1874 they were abandoned and have not been re-occupied. The subsequent creation of the reserve in 1879 has since excluded them. The present generation of Baigas have not as yet settled down to cultivation. They still largely depend on the reserve for their subsistence, into which they make excursions for several days at a time, collecting fruits, hunting and fishing.

Fishing consists in damming streams and poisoning pools with Tinsa bark in consequence of which most of the Tinsa trees in the reserve have been ruined. In other ways also the Baiga is destructive, he is inordinately fond of using his axe.

In order to rob a bee's nest they will notch a fine Sal tree to the top or will even cut the tree down. The same applies to the collection of Ral. For the sake of this comparatively worthless minor product, great numbers of the finest Sal trees have been and are being annually felled. In remote parts of the forest what would amount to heavy fellings have been found made by Baigas for the sake of Ral. There is no doubt also that most of the forest fires are due to Baigas who have entered the forest on some expedition. They are also inveterate poachers and by means of traps, stakes, pits and spears they account annually for a large head of game.

Baigas, on the other hand, have their redeeming qualities. They are first rate axemen, and as such are very useful when fellings have to be made. They are the men who clear and burn the fire lines annually at which they are experts, and they are especially useful in burning internal fire lines in remote places, where it is difficult to induce others to work. It also falls to their lot to collect Harra, Bee's wax, dropped horns, kosa, and without their aid the quantity of minor forest produce realized would seriously diminish.

What is required in order to redeem the Baigas is firstly to induce them to settle and cultivate and look upon the soil as their primary means of support ; secondly, to prevent them making independent expeditions into the forest ; and thirdly, to give them plenty of regulated employment of a congenial nature inside the reserve of which there is abundance to keep them busy.

CHAPTER II.

The Composition and Condition of the Forests.

Distribution and area.

8. The forest consists of a compact block 15 miles long by 10 miles broad. The total area of 62,512 acres is composed of three distinct types of forest, namely, mixed, Sal, and grass land which have been carefully mapped and are found in the following proportions :—

	Acres.
Mixed forest	34,850
Sal forest	18,672
Blank	8,594
Teak	17
Forest villages	379

9. The outer boundary consists of a cleared line, 30 feet wide, with pillars made of upright sal beams fixed in cairns of stones, at corners and conspicuous points.

State of boundaries.

The line is cleared and burned annually as a protection against fire, the pillars, however, are only renewed from time to time as required. Besides the outer boundary just described there is in many places an interior boundary line which was the original boundary line of the fire protected area when the forest was first gazetted in 1879, but has since become an interior line owing to subsequent extensions of the fire protected area in 1889. Since that date it has been neglected and is now only faintly traceable on the ground. There is no reason why it should be maintained.

10. The forest was declared Reserved Forest in *Central Provinces Gazette* Notification No. 917 A. of March 1st 1879, under Section 34 of the Indian Forest Act. In 1889, the area was extended by including 10,880 acres of the unprotected Malidadar forest within the fire protected area. The Malidadar forest was declared a reserve in Gazette Notification No. 888, dated 22nd February 1879.

Legal position.

Again, in the year 1894, the area was added to when the Kisli malguzari forest of 750 acres in size was obtained.

This area was declared Reserved Forest in *Central Provinces Gazette* Notification No. 2462 of 24th May 1894, under Section 19 of Act VII of 1878, Indian Forest Act, being exchanged for an area of the same extent in the Sona forest, Mandla Range.

The area with which the Working Plan deals is composed of the three areas above mentioned and is known as the Banjar Valley Reserve.

11. The Reserve is free from all rights. There are two forest villages situated inside the Reserve. Of these Kisli has been occupied some time ; the other, Bamni Dhadar, is an old village site which has been recently re-occupied, and as it has not yet been demarcated it has not been shown on the map and the area has been included in the grass land situated inside mixed forest lands.

Rights.

The demarcation and mapping of this village is a matter which should be carried out at once.

It is highly undesirable that more villages should be created inside the Reserve. There is abundance of unoccupied ground outside the Reserve to satisfy all demands for land as well as an ample supply of labour to meet all ordinary requirements. A village situated inside the Reserve greatly increases the danger from fire and the damage done by villagers wandering axe in hand through the forest is great and is difficult to control.

Besides these there are a number of villages situated in the Mandla and Balaghat districts, which adjoin the Reserve. The inhabitants of these are permitted to exercise certain privileges of nistar, Paidawar and grazing within the Reserve.

12. There are three distinct types of forests, namely, mixed, sal, and grass lands, each of which will be described in turn.

Composition and condition of the crop.

Mixed forest.—Mixed forest, excluding blanks according to the stock map, covers 34,850 acres of the Reserve. It is composed of those trees and shrubs usually met with in the forests of the Central Provinces, teak, however, except in some parts where it has been artificially introduced, is absent. The mixed forests are found almost exclusively on the hills, sides and tops, commencing at an elevation of 2,000 feet and extending upwards. The forest is dense and has an undergrowth of bamboos. The height growth is generally poor : as the mixed forest adjoins the sal forest there is a certain area of debatable ground between the two which can best be described as mixed forest containing sal. In preparing the stock map it has been thought sufficient to show as mixed forest even forest containing sal when the sal was not present in workable quantities. Sal trees occruring in mixed forest being at the limit of their area and therefore in unfavourable conditions, are poor in height growth and often topsore. Teak, where it has been introduced in two places, has thriven well and should later on reproduce itself. Owing to the scarcity of teak in these and surrounding forests more might be done as regards introducing it. The flat hill tops called "Dadars" are often covered with grass and only sparsely stocked with trees, they have for the most part been mapped ; but as the present Working Plan deals chiefly with sal and exclusively with sal timber, extending only to mixed forests as regards minor forest produce, it has not been thought necessary to prepare the stock maps of the mixed forest with such care and detail, as the stock maps of the sal forests. From the stock maps the mixed forest area is made up of mixed forest 34,850 acres, grass land 1,854 acres. None of these 36,704 acres are capable of producing sal timber.

The names of the trees commonly found in mixed forest have been given in the Appendix.

The reason why sal does not extend up the hill sides is probably not on account of the elevation, but rather owing to the shallowness of the soil, it being a coincidence that an elevation of 2,000 feet or over coincides with a stony shallow soil.

Sal forests.

13. The areas containing sal forest lie between the mixed forest and the grass land, that is to say, between the elevations of 2,000 feet and 1,800. The sal crop varies considerably according to the locality, as will be seen in the description of compartments, given in the Appendix; it will, therefore, be sufficient here to describe only normal conditions of sal forest and to indicate shortly in which respect the crop varies.

The sal forest of the Banjar Valley Reserve has the appearance of a somewhat irregularly worked selection forest.

All age classes are found in close proximity, those of the middle age, *i.e.*, from 3′ to 4′6″ in girth predominate. Mature trees are tall, clean, straight, 70 feet in height and 5 to 6 feet in girth. Underneath these trees and slightly dominated by them, is a full crop of trees and poles 30 to 60 feet in height and varying from 3′ to 4′6″ in girth ready, as soon as the dominant trees have been removed, to take their places. Under the poles, again, and suppressed by them, is a dense mass of suppressed seedlings, generally suffering from the effects of frost and fire, but which, nevertheless, will eventually succeed in forcing their way up.

Few other trees are associated with sal, those chiefly found are saj, tinsa, tendu, haldu lendia, dhawa.

The soil is bare or scantily covered with grass.

Travelling through the sal forest in an upward direction towards the mixed forest one notices that the density of the stock diminishes. Young seedlings give place to bamboos, the height growth of the mature trees is less and other species begin to appear in greater numbers. As one assends still further, many of the trees are topsore especially amongst the pole classes, until one gradually passes into the type of forest already described as mixed forest containing sal.

Forests differing from the above types are met with as follows:—

In exceptionally favourable localities trees reach a height of 120 feet and a girth of 11 feet. In poor localities mature trees only attain a height of 50 feet and 5 feet in girth, and instead of being clean and straight stemmed may be crooked, unsound and covered with epicormic branches.

Regeneration is sometimes entirely absent without apparent reason or the crop may be of so open a nature that regeneration is prevented by frost.

Teak occurs in one place associated with sal where it was planted in 1882, a full description is given elsewhere.

Grass Land.

14. Grass Land is of two types, namely, that which is found inside mixed forest, and that which is found in sal forest. The former has already been cursorily described under the heading of mixed forest to which it properly speaking belongs, and as it never has contained, or could contain, sal, the description need not be added to here. The latter type of grass land is found in the lowest portion of the Reserve from 1,700 to 1,800 feet in elevation, that is to say, below and adjoining the sal forest in which the grass lands properly speaking constitute blanks.

The boundary between the grass land and the sal forest, unlike that between sal forest and mixed forest, is abrupt and well marked, being terminated by a wall of middle-aged sal trees.

The present total area of grass land inside sal forest is 6,740 acres of which it is estimated 675 acres are situated in river beds or swampy places and therefore incapable of ever bearing sal trees. The remaining 6,065 acres, however, are capable of producing first class sal. At present they are covered by isolated trees or clumps of trees, occasionally sal, more generally other species, such as tendu, tinsa, saj, semar, cheola, lendia, ber, bahera, &c.

Between these trees lies an undulating plain of long rank grass full of seedlings of sal tendu, saj, semar, dhawa which have attained the height of the grass and no more, being annually cut down by frost.

Clumps of sal which occur in blanks have usually a large old tree standing near their centre and it has been noticed that the trees gradually decreased in size and age towards the edge of the clump. From this it is safe to conclude that the old mother tree had already got its head above the level of the frost, at the time when the forest was cut down. Since then young sal have grown up under its shelter, which again sheltered younger sal, and thus the clump was gradually extended. Similarly, round the edge of the sal forest the same process is going on, young seedlings appear 200 yards inside the grass lands in numbers Only those, however, immediately next to the sal forest succeed in establishing themselves. In this

manner the forest is gradually encroaching on the grass lands, but the process is an exceedingly slow one, it is useful, however, in indicating the lines along which any attempts at artificial reproduction must proceed.

Grass lands are caused in the first instance by a number of trees having been destroyed in one spot, so that the shelter was removed, subsequently frost has prevented regeneration. Man has been the chief agency in this matter.

All the extensive blanks existing at present were at one time village sites

Injuries to which the crop is liable. Fire.

15. Fire and frost are the two chief injuries to which the crop is liable. Great precautions against fire should be taken as it not only does inestimable damage in itself, but also, by opening out the forest, introduces frost, whereby the damage becomes a lasting one. Owing to the quantities of grass and the inflammable nature of sal wood, fires are more than usually difficult to extinguish and from time to time the Reserve has been almost completely burned over. The last great fire which occurred was in 1897 when the forest burned for six weeks. The damage then done is still clearly seen on the ground. Many of the larger trees were completely burned down or are still standing black and charred. Others, again, were partially burned, but are still living and of little use even as shelter wood. All the young undergrowth had been burned out and is only now coming up again from the root, and many poles had been entirely killed out and have not reproduced themselves.

The most serious damage, however, done by the fire was in thinning out the forest and admitting frost.

Frost.

16. Two large areas in the Kanha and Kisli blocks, amounting to 2,572 acres have, owing to fires and subsequent frost, been necessarily for the present excluded from the coupes prescribed in this Working Plan. These areas are now covered by charred trees of large size with an undergrowth of grass, palms and sal seedlings, which latter are yearly frosted back and show no signs of establishing themselves in the near future. Besides these areas there are a larger number of smaller areas, similarly ruined, which have been found too small to map, but whose total acreage must be large.

Frost is especially severe in the low lying parts, in hollows and in blanks, and annually kills off a large number of poles besides killing off all seedlings found in blanks and thus effectually preventing regeneration.

Along the edge of blanks frost kills off all the lower branches of sal trees up to a height of 15 or 20 feet according to the severity of the frost, with the result that the trees become either topsore or covered with epicormic branches both of which have an injurious effect on the timber.

Climbers.

17. Climbers do much damage to sal trees and have killed and destroyed many. They are especially liable to develop in an area that has been worked over. Provisions are made in this Working Plan in order to curtail the damage as much as possible.

It has been noticed that climbers are particularly numerous in the higher portions of the sal forest in shallow and stony ground.

Climbers are very numerous in the mixed forests and appear on the hill sides like a dense belt extending from about $\frac{1}{2}$ to $\frac{3}{4}$ up the hill. There is no doubt they spread from there into the adjoining sal forest, but prescriptions for dealing with them in such places would for the present be out of place.

Insects.

18. Serious damage by insects to healthy trees has not been noticed. But a defoliating caterpillar does much damage in the Motinala and Phen Reserves and it is therefore probable that the same insect occurs periodically in the Banjar Valley Reserve. Trees when felled are readily bored by a large species of beetle.

Many apparently sound trees when felled were found to contain a circular hole, or knot extending throughout the hole, which greatly detracts from the value of the timber. The cause is not known, but it is probably fire or frost or both. The number of unsound trees varies greatly in localities ranging from 10 to 40 per cent.

CHAPTER III.

System of Management.

Past and present system of management.

19. Past and present system of managements have both been irregular. The Reserve has hitherto been worked at intervals, according as a demand arose, and in consequence the forests have at times been overworked and then allowed to remain unworked for a number of years, until the next demand arose.

The chief work undertaken in the past of which there is any exact record is the sleeper works of 1887-88 when 10,890 broad gauge sleepers were sawn up in the forest and carted to Gondia and Jabbalpur.

The number of trees felled amounted to 3,500. From traces at present found on the ground, the whole area must have been worked over and none but the finest trees felled.

Previous to 1887 and as early as 1864 the Banjar Reserve was worked for sleepers and scantlings which were taken to Jabbalpur where at that time there seems to have been a steady market for this class of produce. During this period sanction was given to cut annually 700 trees, but this figure must have been at times exceeded as in 1870, 55,000 broad gauge sleepers were sawn in the forest and carted to Jabbalpur.

The sleeper works of 1901-1903.

20. Since 1887-88 the Reserve has practically supplied no sal timber, until the present time. In 1901, the present sleeper works were commenced and continued till March 1903. During that period 130,000 small gauge sleepers were sawn in the forest and carted to Nainpur, a distance of 34 miles, where they were disposed of to the Bengal Nagpur Railway at the rate of Re. 1-5-0 per sleeper.

The work of cutting and transporting the sleepers was at first entrusted to a contractor, who was to receive 12 annas for each sleeper passed at Nainpur. The contractor failed owing to several causes, chief amongst which were his reliance on local labour and means of transport, and his desire to make too much profit out of his contract. After the dismissal of the contractor on the 15th June 1902, the work was undertaken departmentally. During the rains sawyers from outside the district were imported, and arrangements made to carry the sleepers by camels. The camels, although eventually proving a failure, through want of camel fodder in the neighbourhood, were nevertheless useful in carrying sleepers in October and November, during which months carts even if available can hardly be used. By slightly increasing the rates for sawing and carting it was found that sufficient men could be retained on the works, and as the rates were attractive rules were easily enforced. The whole works were completed in March 1903.

The rates paid were as follows:—

Logging, anna 1 to 1-6 per cut.

Sawing, annas 4 per sleeper.

Carting, annas 5-4 per sleeper.

Felling at 9″ and barking, annas 3-9 mean rate per tree.

It was found that local men are quite unreliable and given to running away. They should therefore be looked upon as merely a supplement to men imported from outside.

It was also found that men will not come on to the works without an advance of pay which is subsequently difficult to recover.

The area worked over during the sleeper works of 1900-1903 amounted to 6,883 acres composed of mixed forest 2,072, sal 3,174, blank 1,637.

This area is included in the last 5 coupes of the 30 years rotation prescribed.

The area worked over comprises 15 compartments of this Working Plan.

The following table shows the number of trees cut and girths of same:—

No. of compartments worked over Kisli Block.	Area of sal forest in acres.	Girth Classes.				Total felled.
		4 to 5 ft. dead and dying only.	5′ to 6′	6′ to 8′	8′ and over.	
5,7,3,6,14,15,16,11,12,13 1,2,4,9,10.	3,174	1,439	3,542	1,531	442	6,954

From these figures it was calculated that the mean girth of trees cut was 6′1″; total cubic contents of the trees was 256,630 cubic feet calculated up the stem to a girth 2′6″. Thus for the area worked over the yield was 2·2 trees or 80·85 cubic feet per acre of sal forest.

The area worked over is typical of the best type of sal forest at present found in the reserve, these figures are therefore highly instructive as indicating, what the mean annual yield of the reserve will be, and it is from these figures, which are known to be accurate and which are, moreover, the results of actual fellings, that the yield has been estimated.

Special works of Improvement undertaken.

Fire protection.

21. Protection from fire has been attempted with varied success. There is an outer fire line 49 miles long cleared and burned annually at a cost of Rs. 3 per mile. Besides this there are three interior fire lines maintained at a cost of Rs. 4 per mile.—one running from Katie to Sitabuldi through Kanha, a distance of 14¾ miles, a second from Kanha to Sarwantal, a distance of 3½ miles, and a third from Misli to Indri, a distance of one mile. There are also 7 paths having a total length of 27 miles which are annually cleared at a cost of Re. 1 per mile.

Plantations.

22. There are three teak plantations which have been mapped and have a total acreage of 17 acres. Two of these plantations are found in mixed forest and one in sal forest. They were made in 1882 by planting out teak which had been raised in nurseries: the planting seems to have been carried out with great care, the results have been partially successful. The teak planted in the mixed forest areas has thriven and will later on reproduce itself. The teak planted in sal forest has thriven and is as vigorous as surrounding sal regeneration, the trees in small openings have attained a height of 20 feet. Teak planted in the open adjoining the sal forest has been frosted back and has only a height of 6 feet, it has nevertheless succeeded better than naturally sown sal on the same area.

Sisso and khair.

23. Sisso and khair were also planted in the same year ; no signs of the sisso have been found, but the khair is still existing. Khair was planted as a shelter wood under which, when established, it was hoped that the sal would succeed in regenerating itself naturally, after which the khair was to have been utilized as a set off against the initial expenses of planting. The experiment, however, was a failure. The "khair" trees still exist, but have not thriven, and as this species is, at all times, a poor shelter wood, and, moreover, is not found elsewhere in grass lands, its choice was not a happy one. Young sal found under the khair trees do not at present show any improvement over sal growing in the open.

Roads.

24. A road from Kisli to Bailwani through Kanha and another from Kanha to Sondhar were constructed in 1886. These roads were well constructed and can be repaired at small cost.

In 1901 a road was constructed from Kisli to Nainpur and the road from Kisli to Kanha repaired. In the same year a number of small forest roads were made for the extraction of sleepers. Most of these will shortly disappear, but two at any rate, namely, from Kisli to Julk and Kisli to Gortara, will remain serviceable for a number of years.

Buildings.

25. Buildings. In 1902 a large and comfortable forest bungalow was constructed at Kisli and close to it a well was dug.

Past revenue and expenditure.

26. Below are given the average figures of the past 5 years of revenue and expenditure for the reserve, that is to say, from 1895 to 1900. The years 1901 and 1903 have not been included, as during them the sleeper works were in progress and consequently the figures for these years are abnormal.

REVENUE.

	Rs	a.	p
R I *e*	519	1	9
R II *c*	11	10	7
R II *a*	48	7	9
R II *e*	35	0	0
R V *c*	34	15	5
Total	649	3	6

EXPENDITURE.

A I *c*	1	0	0
A I *e*	158	11	0
A II	1	4	6
A VI *c*	1	3	2
A VII *a*	8	13	3
A VII *b*	37	7	6
A VII *c*	4	6	2
A VIII *a*	3	14	4
A VIII *d*	29	15	4
A VIII *f*	1,088	12	10
A VIII *g*	2	9	8
A IX *b*	5	2	7
Total	1,343	4	4

		Rs.	a.	p.
B I *c*		1,199	1	10
B I *d*		75	11	10
B II *c*		151	4	6
B III *f*		58	2	7
Total B		1,484	4	9
Total A and B		2,827	9	1

CHAPTER IV.

Utilization of the Produce.

Marketable products.

27. Marketable products are as follows:—

Sal timber for export. Tinsa, saj, lendia, bija, dhawa, dehangan poles and logs for local consumption.

Bamboos and firewood for local use.

The minor forest products are lac, horns, hides, harra, ral, honey, wax, tikhur, bichandi (root of a shrub) and fruits of mohwa and achar, grass for thatching and fodder.

Line of export.

28. There is only one line of export for sal timber, namely, to Nainpur Railway station, a distance of 34 miles. A good fairweather road at present exists to this place and can be maintained at small annual cost.

Other forest produce will find its way along existing tracks to the market towns such as Mandla, Bamni and Baihar

Markets.

29. Lately there has been no steady demand for sal timber. The construction of the Bengal-Nagpur Railway and of the Gun Carriage Factory at Jubbulpur has for the present made a large demand for sal timber, and it is hoped that the Ordnance Department will be a steady consumer in the future. The construction of the Bengal-Nagpur Railway within 40 miles of the forest has greatly facilitated the work of transport, and it is hoped that by putting a steady supply of sal timber in the market annually purchasers will be attracted and a steady demand created. Jubbulpur and Nagpur are the places where a market is looked for.

Mode of extraction and its cost.

30. Extraction of timbers can be done by carts directly to the railway from most parts of the forest, only in certain of the most difficult places will a hauling elephant be necessary.

From December till April abundance of local carts will be available for transport, these local carts are only capable of removing 18 cubic feet of sal at one time, and if larger logs than this have to be exported, the large class of carts called "Bandis" will have to be obtained from elsewhere which will not be easy. However by squaring the timber it should be able to transport, by means of local carts, logs to meet even a special demand for timber of large size.

The question of roads has been carefully considered and all the main roads which it is necessary to make have been plotted on the map. The cost of extraction and carting of timber to the Railway Station will vary from 4 to 5 annas a cubic foot according to the situation of the annual coupe.

Net value of produce.

31. Sal timber.—The only steady market which has as yet been found for sal timber is the Ordnance Department who will require annually a certain amount of first class sal timber. The Gun Carriage Factory and the Ordnance Department at present pay the Forest Department Rs. 1-2 and Rs. 1-8 per cubic foot respectively for sal extracted from the Motinala and Phen Reserves. The cost of carting this timber from these reserves is 14 annas per cubic foot, whereas it has been calculated that timber can be carted to Nainpur from the Banjar Reserve at Re. 0-5-6 per cubic foot and thence transported at an additional cost of 2 annas per cubic foot by rail to Jubbulpur, thus a saving of 6 annas 6 pies per cubic foot in transport alone is effected by working the Banjar Reserve instead of the Motinala and Phen Reserves. The selling rate of sal timber has been discussed under "Financial Results," and it is there shown that a profit of 12 annas per cubic foot may reasonably be expected.

Value of other forest produce.

32. The following table shows the net value of other produce. It should be borne in mind, however, that the amount of these products is in some instances small and in others the demand can be fully supplied from forests more closely situated to the market:—

Name of product.	Costs of bringing to the market.	Sale price at market (Mandla).	Profit or net profit.
	Rs. a. p.	Rs. a. p.	Rs. a. p.
Bija logs	0 4 3 per cubic foot ...	0 10 0 per cubic foot...	0 5 9 per cubic foot.
Tinsa, Landia ... ... / Dhawa	30 0 0 per 100 poles ...	50 0 0 per 100 poles ...	20 0 0 per 100 poles.
Bamboos	1 4 0 per 100 ...	2 0 0 per 100 ...	0 12 0 per 100.
Lac (Gubri)	9 0 0 per maund ...	12 0 0 per maund ...	3 0 0 per maund.
Lac (Kusam)	9 0 0 do. ...	14 0 0 do. ...	5 0 0 do.
Horns (Samber and Barasinga)	6 0 0 do. ...	7 8 0 do. ...	1 8 0 do.
Horns (Chital) ...	15 8 0 do. ...	60 0 0 do. ...	44 8 0 do.
Harra	0 10 0 do. ...	0 14 6 do. ...	0 4 6 do.
Kosa	1 8 0 per 1,000 ...	2 4 0 per 1,000 ...	0 12 0 per 1,000.
Ral	2 4 0 per maund ...	5 8 0 per maund ...	3 4 0 per maund.
Tikbur	2 4 0 do. ...	6 0 0 do. ...	3 12 0 do.
Mohwa	0 12 0 do. ...	0 12 0 do. ...	
Chironji	6 0 0 do. ...	10 0 0 do. ...	4 0 0 per maund.

CHAPTER V.

Miscellaneous Facts.

33. The present sanctioned forest staff for the Banjar Reserve consists of the Range whose headquarters are at Kisli, under whom there are :

Forest Staff.

3 Foresters, Deputy Rangers or Senior Forest Guards who act as assistants to the Range Officer.
18 Forest Guards, and
1 Range Moharrir.

Out of these the following are employed on the Banjar Reserve, *i.e.*, the area with which this Working Plan deals :—

1 Forester.
9 Forest Guards.

Beside these men 35 fire guards are annually engaged from February 15th to June 15th at Rs. 4 per month each. These men are all engaged in the Banjar Reserve for fire protection.

34. There is an ample and expert labour supply as regards felling already present around the Reserve, sufficient local labour is also available for all logging and squaring purposes ; if, however, more sawing than this is required, labour will have to be imported from elsewhere.

Labour supply.

PART II.

FUTURE MANAGEMENT DISCUSSED AND PRESCRIBED.

CHAPTER VI.

Basis of Proposals.

35. The Banjar Reserve is treated as one working circle, because it comprises one compact block of forest situated in one Range and has one line of export. The working circle consists of 2 blocks, namely, Kisli and Kanha. They have been chosen and marked on the map according to their local lines of export which coincide with the different water sheds they lie in. Thus the Kisli block lies inside the Ghangar basin and the Kanha block in the Sulkan basin.

Working circles, how composed.

36 These two blocks have again been divided into compartments apportioned as follows: In the Kisli block 30 and in the Khana block 59 compartments have been made, as large as possible, in order to fully describe the areas under sal. Their boundaries are natural

Compartments, how composed.

features such as water-sheds and streams, roads have only been used as boundaries when of a permanent nature. It has been necessary to make 10 sub-compartments, 4 in the Kanha and 6 in the Kisli block. Owing to the open nature of the forests found in these sub-compartments it has been necessary for the present to exclude them from the felling areas prescribed in the Working Plan. For the same reasons compartment 20 of the Kisli block has been excluded from the felling area.

Analysis of the crop, method of valuation employed.

37. During the years 1901, 1902, 1903, 3,174 acres of sal were worked over. The number of trees felled were as follows :—

4 to 5 feet dead and dying.	5 to 6 feet.	6 to 8 feet.	Over 8 feet.	Total.
1,439	3,542	1,531	442	6,549

These give an average of 2·2 trees per acre. During these years, however, dead and dying trees of under 5 feet in girth were cut and also all sound trees of 5 feet in girth and over, whereas the prescriptions of this Working Plan limit fellings to trees of 6 feet in girth or over and half the trees of 5 to 6 feet in girth.

With the aid of these figures a careful eye estimate of the yield of each compartment has been made and it has been calculated that the maximum yield is 19,084 trees which gives a mean annual yield of 636 trees or a yield of 1·2 trees per acre.

CHAPTER VII.

Object sought to be attained and Method of Treatment.

38. The object sought to be attained is the maintenance of these forests as high forest in such a condition as to yield the largest possible sustained outturn of timber suitable for market requirements.

The method of treatment adopted is the removal of mature, overmature and dying trees under a system of selection fellings with a view to keeping up the supply of large timber. Even if the selection system was undesirable on other grounds, it is the only form of treatment possible owing to the danger of admitting frost.

The exploitable age or girth.

39. It would be desirable to fix an age-limit for the exploitation of sal. Information, however, on this point is very meagre as yet and it is not considered advisable to prescribe any working on the age basis. The actual age of a tree of a certain girth is not very important at present. The most important point is to consider the girth best adapted to meet the most general demand for timber and to consider how to supply it without overworking the forest. It may be noted here that in the neighbouring Topla Reserve where conditions are much the same as in the Banjar Reserve the mean rate of increase in girth has been found to be about ·43″ per annum. This gives the age of a 6 feet tree as being about 170 years. As far as can be seen at present the most important and steady demand for timber in the future will be the Gun Carriage Factory at Jubbulpur. As their latest timber specification lays down a mean girth of 66″ it is clear that to avoid the risk of rendering ourselves unable to meet the requirements of this market we must fix the exploitable girth at 6 feet. As far as we know at present sal under overage conditions attains maturity with a girth of 6 feet, though this figure varies according to the factors of the locality. So far, however, the demand of the market and sylvicultural requirements agree. Further experiments in the Banjar Reserve are required to assist in establishing this question.

CHAPTER VIII.

The Fellings.

The general working scheme, calculation of the possibility.

40. A felling rotation of 30 years has been fixed, and provided that the demand equals the supply the whole forest will be worked over during this period.

Mature trees of 6 feet in girth otherwise termed "first class trees" may be felled, as also half the number of trees from 5 to 6 feet in girth termed "second class" trees. The annual possibility has been based on the number of stems of exploitable girth and the coupes have been arranged compatible with other considerations so as to give an approximately equal annual yield. The maximum possibility will, therefore, consist of all existing first class trees and half existing second class trees.

Period for which fellings are prescribed

41. The total sal area has been divided into 30 annual coupes fixed with a view to equalizing the annual yield. The possibility fixed is a maximum one and should not be worked up to should there be sylvicultural objections to the removal of any portion of the crop that composes it, should this not be justified by the demand. Each coupe may be kept open for 2 years

also any saleable unsound trees under 5ft. in girth, the retention of which is for sylvicultural reasons unnecessary.

and after the expiry of this period such portions thereof which, in the opinion of the Conservator, have not been fully worked over, should be brought forward as an unworked balance in the Control Forms. Such unworked areas should be worked over before a fresh coupe is opened. Should the coupes be worked departmentally care should be taken to restrict felling to a certain specific portion of the coupe which is deemed to be sufficient to meet the demand and which may happen to fall short of the prescribed possibility. All collection of timber in depôts in anticipation of a demand not presently apparent is to be deprecated. Dead trees have not been included in the possibility, they may be removed annually over the whole area according as the Conservator may see fit.

Areas to be felled annually or periodically.

42. The total area of sal forest is 18,672 acres of which 129 acres consist of small isolated clumps or are situated in inaccessible positions and have therefore been excluded from the felling areas. Similarly 2,572 acres of sal have been excluded for sylvicultural reasons. The balance of acres 15,971 have been divided into 30 annual coupes. From an eye estimate it has been calculated that the maximum total yield is 19,084 stems which divided by 30 gives a mean annual yield of 636 stems. It has not been possible to arrange the coupes so as to fix the annual yields exactly at this figure, but compatible with questions of transport and working this has been done as far as possible. Each coupe has been made to consist of one or more entire compartments.

Dead trees have not been included in the possibility. It is estimated that the yield of dead trees of 3 feet girth and over will be about 1 tree to every 4·4 acres.

Order of allotment.

43. As part of the Kisli block has already (in 1901) been worked over to the extent of 4 coupes, it was deemed best to proceed and work out the Kisli block before proceeding to the Kanha block, more especially as the Kisli block is the most accessible and easily worked of the blocks. It is, moreover, on account of its rich and vigorous growing stock specially indicated for early working on sylvicultural grounds. Turning now to annual coupes these have been arranged primarily in order to facilitate transport so that all the coupes adjoining a road are worked out successively before proceeding elsewhere, where another road would have to be made. Secondary to transport, sylvicultural requirements have been taken into consideration in allotting the coupes.

The following is a tabular statement of the fellings to be made:—

Year of working.	Coupes.				Remarks.
	Compartments which form coupe.	No. of coupe.	Salana acres.	Number of trees which may be felled.	
1904—1906 ...	25, 29, 30	I	533	728	
1905—1907 ...	26, 27,	II	403	544	
1906—1908 ...	22B. 23 B. 24 B.	III	441	534	
1907—1909 ...	19 B, 21 B. 28	IV	483	543	
1908—1910 ...	17 18 B	V	463	545	
1909—1911 ...	56, 57	VI	409	537	
1910—1912 ...	7, 47	VII	508	720	
1911—1913 ...	13 B. 31	VIII	449	627	
1912—1914 ...	32 33, 35	IX	545	695	
1913—1915 ...	26, 28, 29, 30	X	577	722	
1914—1916 ...	22, 27	XI	555	711	
1915—1917 ...	11 B. 14	XII	570	748	
1916—1918 ...	15, 17	XIII	437	543	
1917—1919 ...	16, 18, 19	XIV	498	645	
1918—1920 ...	9, 10, 12	XV	540	641	
1919—1921 ...	4, 8	XVI	506	689	
1920—1922 ...	1, 2, 20	XVII	492	612	
1921—1923 ...	3 5 B. 6 B.	XVIII	569	736	
1922—1924 ...	34, 46	XIX	551	739	
1923—1925 ...	37, 38, 44	XX	499	618	

Year of working.	Coupes.				Remarks.
	Compartments which form coupe.	No. of coupe.	Salana acres.	Number of trees which may be felled.	
1924—1926 ...	42, 43, 59	XXI	473	604	
1925—1927 ...	52, 58	XXII	488	578	
1926—1928 ...	45, 48, 49	XXIII	580	739	
1927—1929 ...	50, 51	XXIV	487	582	
1928—1930 ...	53, 54, 55	XXV	741	750	
1929—1931 ...	5, 7	XXVI	652	647	
1930—1932 ...	3, 6	XXVII	601	571	
1931—1933 ...	14, 15, 16	XXVIII	701	568	
1932—1934 ...	11, 12, 13	XXIX	648	624	
1933—1935 ...	1, 2, 4, 9, 10	XXX	572	544	
Total ...	...	...	15,971	19,084	

Nature and mode of executing the felling.

44. The trees which may be marked for felling are :—

1. All first class trees.
2. Half of the second class trees.
3. Any saleable unsound trees under 5 ft. in girth.

Besides these, dead trees may be removed over the whole area as already indicated. Details as to the mode of executing the markings and fellings may be left to the Conservator. It is important that trees on the edges of blanks should not be felled and that in executing the fellings the creation of even small blanks should be avoided.

Should the demand be reasonably certain to fall short of the probable supply, trees much in excess of the demand should not be marked and in this case trees to be selected by the marking officer should be those that are mature and dying.

Forecast of the condition of the crop at the end of the felling rotation.

45. At the conclusion of the felling rotation all trees of very large girth, that is to say, of 8 feet and over, will have disappeared. On the other hand, the forest will be more uniform as regards the growing stock and the result of the increased fire protection is likely to produce a better regeneration.

Thinnings and other improvement fellings.

46. Thinnings are not necessary, although in some of the denser parts of the forest their action would be beneficial, still, unless entrusted to highly-skilled hands more harm than good might result, and as it is unlikely that the Forest Divisional Officer could personally devote much of his time to this work, they have not been prescribed.

All climbers should be cut when the trees are marked for felling and subsequently at intervals of 15 years. At the same time miscellaneous species suppressing promising young sal growth should be girdled.

CHAPTER IX.

Supplementary Regulations.

Grazing and other rights.

47. At present grazing is not permitted from the 15th February to the 15th June, that is to say, during the period when fire protection is considered necessary. This practice may continue.

The privilege of collecting nistar under the commutation rules.

48. The inhabitants of surrounding villages remove 'nistar' from the Reserve under the commutation system. They are permitted to fell various miscellaneous species. The result is that many trees which would act as nurses to young sal at present struggling to maintain an existence in the blanks have been cut out. By this means the filling up of grass lands with sal is being retarded.

Surrounding villages have ample areas situated elsewhere from which they can satisfy their requirements, and as the exercise of this privilege increases the danger from fire commutation for nister or other forest produce should not be permitted inside the Reserve.

49. In para. 21 of the Working Plan reference has been made to the present fire regulations and their success in the past. The lines which are therein mentioned in detail are shown on the maps. The present outer fire line is sufficient in order to prevent the entrance of fire from surrounding areas. The present interior fire lines act as a check on fire when it has once entered the Reserve; they are, however, not sufficient. All existing roads and alignments of roads prescribed should therefore be maintained as interior fire lines.

Improvements common to the whole area. Fire protection.

Miscellaneous Prescriptions.

50. There are at present 6,065 acres of grass land in the Reserve from which the revenue derived is negligible, but which are nevertheless capable of producing first class sal forest and from which the yield might be as high as that obtained from the richest part of the Reserve. Owing to a lack of perseverance and an unhappy choice of a shelterwood efforts to restock grass land with sal have so far failed. Efforts to restock similar areas in other provinces have also been unsuccessful. The task of converting blanks into sal forest is therefore not an easy one, and this fact combined with our limited knowledge on the subject, has made it advisable to limit for the present any attempts on these lines to experiment. Every effort should be made to discover a suitable method of restocking blanks. With this view an area situated in the Kisli grass lands has been mapped as suitable for such experiments. The lines which these experiments should take are indicated as follows:—

Stocking of blanks.

Any attempt at introducing sal without first establishing a shelterwood will fail. Conditions at present existing in the grass land clearly demonstrate this and also show what species are suitable as shelterwood, *viz.*, Salai (Boswellia serata), Tendu (Dyosfyros melanoxylon), Cheola (Butia frondosa), Semar (Bombax malabaricum) and bamboos.

These and other species should be introduced either by sowing or planting or from cuttings. Little is known as to the capabilities of Indian trees to reproduce themselves from cuttings, but it is known that many do, amongst others bamboos and salai.

It is possible, therefore, that a suitable shelterwood may be quickly produced by planting large cuttings at the end of the hot weather. A shelterwood thus introduced will have the advantage of commencing life somewhat above the frost level and will also be capable of attaining a suitable size for shelterwood at an earlier date than trees introduced by sowing. Experiments in the lines above mentioned should be commenced at once and maintained until success is achieved or until it has been clearly demonstrated that the task is an impossible one.

51. The Range Officer should carefully check and correct the existing stockmaps for each coupe as it comes to be worked over. In this manner the stock maps at the end of the felling rotation will be absolutely correct.

Correction of maps.

52. Ral.—This comparatively worthless minor product has been the cause of much damage to valuable sal trees in the past. As the temptation to notch and cut down trees in order to facilitate its collection is so great, and as no adequate check can be maintained on the methods by which it has been obtained, the collection of ral should be in the future entirely prohibited.

Collection of Ral.

53. The question of roads has been carefully considered and all the main roads necessary have been plotted on the map. They will have to be constructed as the adjoining areas come to be worked. The roads should be strongly constructed at Nalas, on hillsides or at difficult places so that when the next period arrives only repairs will be necessary.

Construction and maintenance of roads.

The following table gives further details concerning the roads:—

Existing Roads.

From	To	Distance.	Remarks.
Khatua	Bhilwani	14¾ miles.	These roads will require Rs. 8 per mile for repairs when they come to be used.
Kanha	Sarwantal	3½ miles.	
Kisli	Jhuluk	4 miles.	
Kisli up Ghagur and through forests.	Pillar No. 60	3¾ miles.	

Roads of a permanent nature which it is necessary to make and which have been plotted on the map:—

From	To	Distance	Estimated cost.
			Rs. a. p.
Kanha	Sole	5½ miles ...	95 0 0
Orna	Kisli-Belwani road by Sarwahi ...	4½ miles ...	190 0 0
Between Pillar 25 and 26 ...	Kafedabra	4½ miles ...	110 0 0

These roads run through the main sal areas. From them it will be necessary to make short branch roads of a purely temporary nature in order to exploit each coupe. Owing to their temporary nature it has not been thought necessary to mark them on the map. It is estimated that temporary roads will average 6 miles a year and will cost approximately Rs. 50 per annum.

Proposed changes in the Forest Staff.

54. The range should always be held by a trained Range Officer of proved merit. The prescriptions of the Working Plan will entail the necessity of adding one forester and three forest guards to the present staff. The duties of these men will be to assist the Range Officer in marking tress, superintending fellings, logging, extraction of timbers, &c.

Buildings.

55. A forest rest house and new range quarters have recently been built at Kisli. A hut exists at Kanha, but it is no longer serviceable and should be replaced by a rest house similar to the one recently built at Kisli, the cost of which will be Rs. 1,300.

Financial result and selling rates of sal discussed.

56. The financial results cannot be estimated with any certainty as only one market for sal timber has as yet been found. The following figures show in what respects this Working Plan will effect the annual revenue and expenditure. With the object of calculating the minimum rate per cubic foot at which sal timber should be sold at Nainpur, expenditure and loss of revenue has been divided into two classes according as it is directly due to the working of the sal forests or not.

Expenses incurred not directly due to the working of sal forests :—

Whether capital or recurring.	Reasons for expenditure or loss of revenue.	Amount.
		Rs.
R II*e*.—Recurring	Loss of Revenue due to prohibition of the collection of Ral per annum.	20
A VII*b*.—Capital	Cost of erection of Rest House at Kanha	1,300
A VIII*g*.—Recurring	Estimated cost of experiments to restock blanks per annum ..	40
A VIII*f*—Capital	Expenditure on clearing roads and alignment of roads as fire lines 18¼ miles.	73
A VIII*f*—Recurring	Up-keep of above fire lines	73
	Total ...	1,506

Expenses directly due to the working of sal forests.

	Item of expenditure and estimated rates.	Total mean cost per annum.
		Rs. a. p.
A VIII*f*	Cost of marking trees	40 0 0
B I*c*	Cost of increase of staff	366 0 0
A I*a*	Cost of felling and barking trees at mean rate as. 3-9 per tree ...	149 1 0
A I*a*	Cost of logging at 3 cuts per tree at Re. 0-1-6 per cut	178 14 0
A I*a*	Cost of extraction and carting timber to Nainpur at 0-5-0 annas per cubic foot taking 40 cubic feet to a tree.	7,950 0 0
A VII*a*	Cost of road making	50 0 0
A VI*c*	Incidental expenses, tools	50 0 0
	Total ...	8,783 15 0

Thus the mean annual expenditure in connection with working the sal forests is calculated at Rs. 8,784. The mean annual yield is 636 trees which are calculated to yield on an average 40 cubic feet per tree or 25,440 cubic feet. Thus the expense of landing a cubic foot of sal timber at Nainpur is 5½ annas. It is not likely that this rate will be exceeded.

The royalty on sal timber is four annas a cubic foot. Considering the quality of timber produced a profit of at least 12 annas per cubic foot might be expected. The price of sal timber at Nainpur should therefore be not less than Re. 1-2-0 per cubic foot.

Another point which suggests that a profit of 12 annas per cubic foot may be expected is the fact that the sal timber at present landed in Jabbulpur from the South Phen and Motinala Reserves fetches Re. 1-2 to 1-8 per cubic foot. If timber from the Banjar Valley is to be landed at Jabbulpur, an additional expenditure of 2 annas per cubic foot will be incurred on truck hire from Nainpur to Jabbulpur, thus making the cost of landing sal timber at Jabbulpur to be 7½ annas per cubic foot. It is reasonable to expect that an average price of Re. 1-5 per cubic foot will be obtained at Jabbulpur for sal timber in the future in which case the profits will be Re. 0-13-6 per cubic foot, thus the expected revenue from sal timber is Rs. 21,465. From the above figures it will be noticed that the cost of transport is by far the largest item in the expenditure and that any arrangements which would reduce the cost by even 1 or 2 annas per cubic foot would probably result in a saving. When a steady market at the above rates and when some experience in working the forests have been obtained some saving on the cost of transport will probably be possible.

The following is a tabular statement showing estimated revenue and expenditure by subheads complete for the Banjar Valley Reserve :—

REVENUE.

From				Rs.	a.	p.
RI *a* Sal timber	...	...	...	33,390	0	0
RII *c*	...	...	...	12	0	0
RII *d*	...	...	...	48	0	0
RII *e*	...	...	...	15	0	0
RV *c*	...	...	...	35	0	0
		Total	...	33,500	0	0

EXPENDITURE.

AI *a*	...	...	...	11,925	0	0
AI *c*	...	...	...	1	0	0
AI *e*	...	...	...	159	0	0
AII	...	...	...	1	0	0
AVI *c*	...	...	...	51	0	0
AVII *a*	...	...	...	59	0	0
AVII *b*	...	...	...	37	0	0
AVII *c*	...	...	...	4	0	0
AVIII *a*	...	...	...	4	0	0
AVIII *d*	...	...	...	30	0	0
AVIII *f*	...	...	...	1,164	0	0
AVIII *g*	...	...	...	43	0	0
AIX *b*	...	...	...	5	0	0
BI *c*	...	...	...	1,565	0	0
AVIII *b*	...	...	...	83	0	0
		Total	...	15,131	0	0

From the above figures it is calculated that the financial results will be a net annual profit of Rs. 18,369 for the area with which this working plan deals.

APPENDIX B.

Description of Compartments.

Name of Block.	No. of compartment.	Area in acres.				Coupe in which compartment is included.	
		Sal.	Mixed.	Blank.	Total.		
Kisli.	1	49	177	396	622	XXX	Sal area is insignificant, a large mixture of other species. Regeneration is poor. Large trees in excess. Sal area is likely to extend within the next 30 years. Was worked over in 1901, the yield will be considerably below normal. Yield estimated at 49 trees.
	2	125	433	160	718	XXX	Sal area is small. Crop is good except where it adjoins the mixed forest. Middle aged trees predominate. Height growth is good and regeneration vigorous. Above the average type of sal forest found in the Reserve. Was felled over in 1901. Owing to this yield will be reduced when next felled over. Yield estimated at 102 trees.
	3	301	...	195	496	XXVII	Area is entirely composed of sal and grass lands. Many large trees. Sal areas fully stocked. Middle aged trees in excess. Regeneration is vigorous. Crop is characteristic of the best type of sal forest. Felled over in 1901. Owing to this the yield will be less when again felled over. Yield estimated at 271 trees.
	4	90	165	53	308	XXX	Area mostly composed of sal and mixed forest. Sal varies much. In the higher portions sal is poor. Bamboos are very numerous. Climbers are doing much damage. In the lower portions the crop is good. Height growth is exceptionally good. Middle aged trees are in excess. Regeneration is poor and suffers from frost. Felled over in 1903. Yield will be thus reduced. Yield estimated at 73 trees.
	5	218	186	26	430	XXVI	This compartment differs in no essential feature from compartment 4. It was also felled over in 1903. Yield estimated at 213 trees.
	6	300	...	80	380	XXVII	The sal crop is in process of removal. Regeneration is better than in most places. Was felled over in 1903. Yield estimated at 300 trees.
	7	434	67	25	526	XXVI	Very similar in character to compartment 6. Regeneration is particularly good. Trees on this area attain a large girth without becoming unsound. Was felled over in 1902. Yield estimated at 434 trees.
	8	...	1,087	108	1,195	...	Does not contain sal in workable quantities. A fringe of sal trees runs between the mixed areas and grass lands which is likely to extend.
	9	140	28	15	183	XXX	Contains good sal forest. Regeneration is also good. Bamboos are numerous in parts and seem to be extending. Was felled over in 1901. Yield estimated at 142 trees.
	10	168	12	35	215	XXX	Similar to compartment 9. Was also felled over in 1901. Higher portions of sal forest contains other species. Yield estimated at 178 trees.
	11	185	33	52	270	XXIX	Contains one of the most vigorous sal forest found in the Reserve. Regeneration abundant. Gave a large yield in 1902, when this compartment was felled over; consequently the yield will be less when next worked over.
	12	298	42	40	380	XXIX	Differs in no essential respect from compartment 11. Was also worked over in 1902. Yield estimated at 317 trees.
	13	165	52	...	217	XXIX	A large number of middle aged sal trees of fine growth. Regeneration abundant. General appearance of growing stock is vigorous and healthy. Was felled over in 1903. Yield estimated at 132trees.
	14	185	...	72	257	XXVIII	Similar to compartment No. 13. Was worked over in 1901. Yield estimated at 167 trees.
	15	277	166	...	443	XXVIII	Growing stock varies much. In the higher portions poor with a large mixture of other species. Lower portions consist of pure sal, but the height growth is poor and regeneration is scanty. Felled over in 1902, yield estimated at 217 trees.

Description of Compartments—(contd.)

Name of Block.	No. of compartment.	Area in acres.				Coupe in which compartment is included.	
		Sal.	Mixed.	Blank.	Total.		
Kisli.	16	239	681	488	1,408	XXVIII	Consists mostly of mixed forest. Sal forest is mostly poor. A large admixture of other species and bamboos. Height growth poor and stems crooked. Regeneration almost wanting. Climbers numerous. Was felled over in 1902. Yield estimated at 184 trees.
	17	205	272	...	477	V	Growing stock consists mostly of poor forest. Large number of topsore trees. Only in the lower portions is regeneration found. The higher areas now containing sal are likely to change into mixed forest. Yield estimated at 207 trees.
	18 A	430	...	82	512	...	Sal crop very open. Many trees have been destroyed by fire and frost has been admitted. Growing stock consists almost entirely of scattered trees of very large girth and here and there of trees 1 to 2 feet in girth. Regeneration entirely absent. Soil covered with palms and grass, only in a few of the higher portions where bamboos are found has any young growth succeeded in establishing itself. This area cannot be felled in during the present rotation.
	18 B	258	495	...	753	V	Sal is mostly poor but contains many trees of good girth Many topsore trees. Only in lower portions is regeneration found. Climbers and bamboos numerous. Many trees have been destroyed by Baigas for the sake of Ral. Yield estimated at 338 trees.
	19 A	213	...	11	224	...	Very similar to 18 A. Only more bamboos are found and consequently the young growth has suffered less from frost. This area will therefore be capable of being worked at an earlier date than 18 A, but cannot be worked during the next 30 years. Many trees have been destroyed by Baigas for the sake of Ral.
	19B	187	299	...	486	IV	Sal is mostly poor, but contains many old trees. Many topsore trees. Regeneration almost wanting and many small blanks where large trees have come out. Yield estimated at 229 trees.
	20	262	1,705	...	1,967	...	Similar to 19 B, but contains more sal and better timber. Should not be felled in during the present felling rotation, but will be ready by the next one. Young sal trees are coming away.
	21A	340	...	75	415	...	In this compartment regeneration has just succeeded in establishing itself, but as there is still danger from frost it will not be safe to remove any of the shelter trees during the present rotation. This area should eventually produce good sal.
	21B	188	596	43	827	IV	Consists mostly of mixed forest. The area is very similar to 21 A, only the regeneration is so complete that light feelings may be made during the present regeneration. The mature trees are poor in height growth and are covered with epicormic branches. Yield will be small. Climbers numerous and doing much damage. Many trees have been destroyed for the sake of Ral. Yield estimated at 217 trees.
	22A	447	64	293	804	...	This area has also been destroyed by fire and regeneration prevented by frost. A large number of bamboos present which shelters the young sal a fair number of which have established themselves and are coming away. For the present rotation no fellings should be made. Eventually good trees should be produced.
	22B	135	...	10	145	III	Differs in no essentials from 21B. Yield estimated at 136 trees.

Description of Compartments—(contd.)

Name of Block.	No. of compartment.	Area in acres.				Coupe in which compartment is included.	
		Sal.	Mixed.	Blank.	Total.		
Kisli.	23A	10	...	69	79	...	Consists of a fringe of old and middle-aged trees extending along the edge of a blank. Height growth fair. No regeneration at present. Owing to the open nature of the growing stock and want of regeneration cannot be felled over during the present rotation. It is hoped the sal will spread over some of the adjoining blank.
	23B	134	774	...	908	III	A poor type of sal forest. The locality does not seem capable of producing trees of large size. Climbers are numerous. Yield estimated at 136 trees.
	24A	8	...	36	44	...	Differs in no respect from 23A.
	24B	172	751	3	926	III	In the lower portions contains some good sal forest, but for the most part coosists of poor forest. Climbers are numerous. Yield estimated at 266 trees.
	25	161	473	100	734	I	Consists mostly of mixed forest. The sal forest is good. Height growth especially good. Many large trees. Regeneration sufficient. Yield should be good. Yield estimated at 142 trees.
	26	192	458	72	722	II	Consists mostly of mixed forest. Half the sal area is average sal forest. The rest is poor sal forest. The yield should be average. The largest trees are found at the edges of blanks where the forest is open. Yield estimated at 270 trees.
	27	211	165	27	403	II	Most of the sal forest is exceptionally good. Height growth good. Many large apparently sound trees. All age classes fully represented. Regeneration exceptionally dense and vigorous. In the portions adjoining the mixed forest the sal forest is poor. Yield estimated at 247 trees.
	28	108	141	12	261	IV	Consists mostly of poor sal forests. All age classes represented. Height growth poor. Regeneration is very uneven and patchy. Climbers are numerous. Large number of bamboos and other species. Yield estimated at 97 trees.
	29	150	13	8	171	I	In lower portions sal forest is good, but a large portion is on high ground adjoining mixed forest where the sal is poor and many bamboos and other species are found. Yield estimated at 195 trees.
	30	222	...	62	284	I	Good sal forest throughout. All age classes are fully represented. A large number of trees of good height and girth. In higher portions climbers are numerous and sal is not so good. Yield estimated at 319 trees.
Total ...	...	7,207	9,335	2,648	19,190	...	
Kanha ...	1	308	660	399	1,367	XVII	Consists mostly of mixed forest. Sal found in clumps which are gradually extending to meet each other. Many large trees and height growth good. Yield will be large. Yield estimated 424 trees.
	2	120	580	72	772	XVII	Consists mostly of mixed forest. Sal found in clumps and varies. In the lower portions some good trees are found, but in higher portions height growth is poor. Regeneration fair. Sal is extending. Yield estimated 132 trees.
	3	161	88	50	299	XVII	Sal is almost pure. Height growth good. Many large trees and poles. In higher portions height growth is not so good and many climbers are found doing much damage. Yield estimated at 197 trees.
	4	210	...	35	245	XVI	Sal where found is almost pure. Contains many fair trees and poles. A few small blanks which are filling up. Yield estimated at 253 trees.

Description of Compartments—(contd.)

Name of Block.	No. of compartment.	Area in acres.				Coupe in which compartment is included.	
		Sal.	Mixed.	Blank.	Total.		
Kanha	5A	276	...	62	338	...	Opeo sal forest. Has suffered much from fire. Many fine trees have been burned. Their size shows that this area is capable of producing first class sal. Many trees of very large girth dead or dying. Also a quantity of trees 2 feet in girth and 30 feet in height showing that owing to a number of favourable seasons some regeneration has taken place. At present soil is covered with palms and grass. Young sal is all frosted back annually. No felling can take place during present rotation.
	5B	150	147	29	326	XVIII	Height growth poor ; few large trees. In the higher portions many dead and dying. Regeneration is sufficient. Yield estimated at 180 trees.
	6A	72	9	98	179	...	Differs in no essential respect from 5 A.
	6 B	258	81	...	339	XVIII	Crop varies much; is rather open, especially in the lower portions where, however, the trees are finer and regeneration is poor. In the higher portions regeneration is sufficient, but mature trees are small. Yield estimated at 359 trees.
	7	236	36	2	274	VII	Contains much fine sal forest, especially in the lower portions where the yield will be good. In the higher portions the sal is short and many topsore trees are found. Climbers numerous. Yield estimated at 314.
	8	296	...	52	348	XVI	Consists almost entirely of sal forest. Growth very vigorous. All age classes fully represented. Many trees of large girth. Yield estimated at 432 trees.
	9	206	8	46	260	XV	In lower portions of the area the sal forest is good with good height growth. In the higher portions forest is poor. Many climbers doing much damage. Many trees have been cut for Rai. In higher portions bamboos are numerous and have killed out young sal. Yield estimated at 290 trees.
	10	160	...	40	200	XV	Consists mostly of sal forest which is good. A number of small blanks are found throughout which are filling with sal. In higher portions climbers are numerous. Yield estimated at 213 trees.
	11 A	196	...	89	285	...	Consists of open sal forest. Growing stock is represented chiefly by middle-aged sal. Soil is covered with grass. Young sal is annually frosted back. Cannot be felled in during the present rotation.
	11 B	257	14	3	274	XII	Consists mostly of poor sal forest. Old trees predominate ; many bamboos. Regeneration is poor. Many topsore and dying trees. Many trees have been destroyed for the sake of Rai. Only in portions adjoining 11 A is good sal forest found. Climbers are numerous. Yield estimated at 326 trees.
	12	174	...	1	175	XV	Sal varies much according to configuration of the ground. In hollows is good, but on hill tops and sides where the soil is strong and shallow, sal is poor. Climbers numerous. Yield estimated at 238 trees.
	13 A	318	9	. 5	332	...	Similar to 5 A except that small portions of mixed forest are found.
	13 B	319	5	98	422	VIII	Contains one of the finest sal crops found in the Reserve. Many trees of large girth and splendid height growth. All age classes vigorous and fully represented. The locality is similar to adjoining areas which have been destroyed by fire and shows what such areas are capable of yielding if protected. Yield estimated at 486 trees.

Description of Compartments—(contd.)

Name of Block.	No. of compartment.	Area in acres.				Coupe in which compartment is included.	
		Sal.	Mixed.	Blank.	Total.		
Kanha.	14	313	49	28	390	XII	In the higher portions poor sal forest with bamboos. In the lower portions sal is average. Yield estimated at 422 trees.
	15	240	2	30	272	XIII	In the higher portions scattered sal trees, many topsore. Many bambons which are preventing regeneration. In the lower portions good sal is found. Yield estimated at 318 trees.
	16	150	315	60	525	XIV	Varies somewhat in the higher portions. Sal is scattered and small in the lower portions. Sal is denser, but the height growth is poor. Many climbers present. Yield estimated at 175 trees.
	17	197	326	43	566	XIII	In the nigher portions sal forest is poor. Many dead and dying trees. Poles are mostly topsore. Mixed forest is encroaching on the sal areas. In the lower portions sal is better. Regeneration is poor. Yield estimated at 225 trees.
	18	110	522	394	1,026	XIV	Has been heavily worked in the past. Contains good sal forest except in bigher portions. Climbers numerous. Yield estimated at 111 trees.
	19	238	3	110	351	XIV	Contains good sal forest. Height growth somewhat below the average. Has been heavily worked in the past. Contains some small openings which are filling up. Climbers very numerous. Yield estimated at 359 trees.
	20	64	399	160	623	XVII	Contains 3 patches of sal forest. Two of which contain good sal. The third, *viz.*, that which adjoins the Salkum Nala is open and contains many other species. Very little can be felled in these patches. They will in time spread over the adjoining grass lands. Yield estimated at 56 trees.
	21	...	516	36	552	...	Contains no sal. Mixed forest and grass lands only.
	22	311	235	112	658	XI	Contains mostly poor sal forest. Only portions along the Sarwali Nala contain good sal. Climbers numerous. Many dead and dying trees. Regeneration poor. Yield poor. Contains a patch of acres of teak plantation which is included in mixed forest area. Yield estimated at 397 trees.
	23	2	1,674	457	2,133	...	Consists almost entirely of mixed and grass lands. Only one small patch of isolated sal inaccessible and unworkable. One patch of 2 acres of teak plantation has been included in the mixed forest area.
	24	33	3,304	688	4,025	...	Contains only 3 isolated patches of sal forest which are likely to extend. In the meantime owing to their small size and inaccessible position are not worth working and have therefore been excluded from the coupes.
	25	24	2,754	34	2,812	...	Contains one small patch of sal similar to the patches in compartment 24.
	26	58	490	11	559	X	Consists mostly of mixed forest. Sal forest is poor. The yield will be small. Climbers numerous. Yield estimated at 47 trees.
	27	244	52	3	299	XI	Contains poor sal forest. Height growth poor. Few first class trees, but second class trees are numerous. Yield estimated at 314 trees.
	28	192	94	...	286	X	Contains poor sal forest. Many small blanks. Height growth poor and few trees of the first class, but many of the second class. Yield estimated at 252 trees.
	29	127	80	1	208	X	In the lower portion sal forest is fair, but in the higher portions is decidedly poor Contains many small blanks and a large number of bamboos and miscellaneous species. Yield estimated at 148 trees.

Description of Compartments—(contd.)

Name of Block.	No. of compartment.	Area in acres.				Coupe in which compartment is included.	
		Sal.	Mixed.	Blank.	Total.		
Kanha.	30	200	...	5	205	X	Contains good sal forest in the lower portions. Crop adjoining blanks is very open. Regeneration wanting. In higher portions poor forest only is found. Yield estimated at 275 trees.
	31	130	...	6	136	VIII	Contains fair sal forest Rather open. Few large trees, but middle-aged trees of good shape and well grown. Many young grow almost entirely absent. Yield estimated at 141 trees.
	32	213	55	170	438	IX	Contain good sal in the lower portions. Crop where it adjoins blanks is very open. Many poles but young growth absent. In higher portions crop is poor. Yield estimated at 270 trees.
	33	240	60	7	307	IX	Contains much good sal forest, especially in the lower portions adjoining blank. Crop is open and contains no young growth. In higher portions crop is poor, but some large trees are found. Damage has been done by collection of Ral. Yield estimated at 339 trees.
	34	286	521	238	1,045	XIX	Crop varies, much open and patchy in places, in others good, especially in the lower parts. Higher portions poor. Regeneration is sufficient. Yield estimated at 356 trees.
	35	92	396	...	488	IX	Does not contain much sal forest which is poor throughout. Wanting in height growth and scanty regeneration. Yield estimated at 87 trees.
	36	19	1,803	...	1,822	...	Consists of mixed forest with the exception of one small isolated patch of sal which is excluded from the felling area owing to its inaccessible position.
	37	125	290	...	415	XX	Consists mostly of mixed forest. Sal area contains many fine trees, but owing to the open nature of the forest many cannot be felled. Regeneration establishing itself, but not yet sufficient. Many small blanks. Seems to have been excessively worked in the past. Yield estimated at 150 trees.
	38	168	892	...	1,060	XX	Sal area contains many good trees, but has evidently been heavily worked in the past and the blanks thus caused have not yet been thoroughly filled up. Owing to this it would be inadvisable to fell all mature trees Area is very similar to compartment 37. Yield estimated at 198 trees.
	39	10	486	...	496	...	Only contains 4 isolated patches of sal which owing to their inaccessible position have been excluded from the felling areas. These patches are likely to extend.
	40	...	1,420	23	1,443	...	Contains no sal forest.
	41	41	1,711	322	2,074	...	Contains 4 patches of isolated sal forest similar to those in compartment 39.
	42	39	577	...	616	XXI	Contains two patches of sal forest from which the yield will be small. Many topsore trees. Regeneration scanty. Yield estimated at 28 trees.
	43	174	357	...	531	XXI	Contains many fine trees, but the forest is open and regeneration is not good, thus many trees cannot at present be felled. By the time this area comes to be worked over, however, it is hoped regeneration will be complete. Has been heavily worked in the past. Yield estimated at 208 trees.
	44	206	16	...	222	XX	Varies greatly. In some parts good trees are found, in others trees are small. Regeneration is sufficient. Climbers are numerous, has been heavily worked in the past. Yield estimated at 270 trees.
	45	164	87	...	251	XXIII	In the lower portions sal is fair, in the higher portions poor. Regeneration is sufficient. Numerous small blanks which will fill up; has been heavily worked in the past. Yield estimated at 192 trees.

Description of Compartments—(concld.)

Name of Block.	No. of compartment.	Area in Acres.				Coupe in which compartment is included.	
		Sal.	Mixed.	Blank.	Total.		
Kanha.	46	265	...	89	354	XIX	Contains good sal forest thruughout. Few large trees, but a very even crop of poles and middle-aged trees. Numerous small blanks are present which will fill up. Yield estimated at 383 trees.
	47	272	8	415	695	VII	Probably contains the finest sal in the Reserve. Many trees of splendid height growth and large girth. All age classes fully represent; 8 acres of teak forest are shown under the heading of mixed forest. Yield estimated at 406 trees.
	48	256	10	481	747	XXIII	Contains much grass land. Sal present uneven. Few large trees. Many small blanks. Climbers very numerous. Regeneration sufficient. Yield estimated at 345 trees.
	49	160	108	...	268	XXIII	Varies greatly. Poor and good sal forest much intermixed. Height growth generally poor. Few large trees. Climbers numerous. Yield estimated at 202 trees.
	50	259	40	25	324	XXIV	Very similar to compartment 49. Crop varies much. In lower portions thick sal forest, but height growth poor. In upper portions poor. Climbers numerous. Many small blanks. Yield estimated at 320 trees.
	51	228	170	...	398	XXIV	Contains poor sal forest. Few trees of good height or large girth. Many dead and dying trees. Climbers numerous. Yield estimated at 262 trees.
	52	222	773	50	1,045	XXII	Varies greatly. In lower portions sal is almost pure, but poor height growth. Many small blanks. Regeneration, scarce. Large trees few and isolated. Has been heavily worked in the past. Yield estimated at 248 trees.
	53	339	1,642	11	1,992	XXV	Contains few large trees. Crop mostly poor. Height growth poor. Climbers numerous. Many topsore trees. Yield estimated at 327 trees.
	54	222	225	468	915	XXV	At present contains very few trees of exploitable size. Regeneration sufficient and vigorous. Climbers very numerous. This area has the appearance of only comparatively lately being covered with sal forest. Yield estimated at 228 trees.
	55	180	290	40	510	XXV	Very similar to compartment 54, but contains many topsore trees. Yield estimated at 195 trees.
	56	223	32	171	426	VI	Consists mostly of good sal forest. Height growth good. Many large trees. Numerous small blanks which will fill up. Higher portions contain poor sal forest with many topsore trees. Regeneration poor. Yield estimated at 311 trees.
	57	186	106	50	342	VI	In lower portions good sal forest is found. Numerous small blanks which will fill up. In higher portions sal is poor and many other species appear. Yield estimated at 226 trees.
	58	266	855	119	1,240	XXII	Contains some good trees, but forest is very open and in danger of passing into mixed forest. Numerous small blanks. Has been heavily worked in the past. Yield estimated at 330 trees.
	59	260	133	8	401	XXI	In lower portions contains good sal forest, but in higher portions is similar to compartment 58. Many bamboos and climbers. Yield estimated at 368 trees.
Total —	...	11,465	25,515	5,946	42,926		

APPENDIX C.

Statement showing different classes of forest by block.

Block.	Teak.	Forest village.	Unworkable sal.	Sal excluded from coupes for sylvicultural reasons.	Workable sal forest.	Grass lands in mixed forest and incapable of producing sal.	Grass land in swamp and other places incapable of producing sal.	Grass land capable of producing sal.	Mixed forest.	Total.
Kisli ...	...	379	...	1,710	5,497	...	266	2,382	9,335	19,569
Kanha ...	17	...	129	862	10,474	1,854	409	3,683	25,515	42,943
Total ...	17	379	129	2,572	15,971	1,854	675	6,065	34,850	62,512

A. A. DUNBAR BRANDER.

APPENDIX D.

Statement showing the principal trees and shrubs with their vernacular names.

Natural order.	Botanical names.	Tree or shrub, climber, &c.	Vernacular names.		Remarks.
			Hindi.	Gondi.	
1	2	3	4	5	6
Anacardiaceæ ...	Buchanania latifolia.	Tree ...	Char ...	Horka Marra.	Valuable for boxes, windows, frames.
Do.	Semecarpus anacardium.	Do. ...	Bhilawa ...	Do.	
Do.	Mangifera indica ...	Do. ...	Am ...	Do.	
Do.	Odina wodier ...	Do. ...	Jhingan ...	Do.	
Anonaceæ ...	Milusa velutina ...	Moderate sized tree.	Domsal ...	Kutki.	
Apocynaceæ ...	Holarrhena antidysenteria.	Small tree ...	Kura ...	Samoky.	
Bignoniaceæ ...	Stereospermum chelonoides.	Large tree ...	Chota Palang	...	
Bixineæ ...	Flacourtia ramontchi.	Small thorny tree	Kuttar ...	Kutian.	
Burseraceæ ...	Garuga pinnata ...	Large tree ...	Ghogar ...	Gurgu.	
Do. ...	Boswellia Serrata...	...	Salai ...	...	
Combretaceæ ...	Terminalia Arjuna ...	Large tree ..	Kahua ...	Mangi Marra.	
Do. ...	Do. bellerica...	Do. ...	Behera ...	Thaka Marra	Valuable for plough shafts and carts, packing cases, &c.
Do. ...	Do. chebula ...	Do. ...	Harra ...	Mahoka.	
Do. ...	Do. tomentosa	Do. ...	Saj ...	Marda Marra.	
Do. ...	Anogeissus latifolia...	Do. ...	Dhaura ...	Yerma Marra	Valuable for axe handles, axes, &c.
Depterocarpeæ	Shorea robusta ...	Do. ...	Sal ...	Piujal ...	Valuable for sleepers, beams, plankings, &c.
Ebenaceæ ...	Diospyros Melonoxylon.	Moderate sized tree.	Tendu ...	Tumri.	
Euphorbiaceæ ...	Briedelia Retusa ...	Large tree ...	Kassai ...	Kassi.	
Do. ...	Phyllanthus Emblica	Moderate sized tree.	Aula ...	Nelli.	
Gramineæ ...	Dendrocalamus Strictus.	Bamboo ...	Bans ...	Wadur.	
Leguminosæ ...	Bauhinia Racemosa ..	Moderate sized tree.	Kachnal ...	Dhondri Marra.	

Statement showing the principal trees and shrubs with their vernacular names—(concld.)

Natural order.	Botanical names.	Tree or shrub, climber, &c.	Vernacular.		Remarks.
			Hindi.	Gondi.	
1	2	3	4	5	6
Leguminosæ ...	Baubinia Variegata ..	Moderate sized tree.	Kachnar ...	Dhondri Marra.	
Do. ...	Acaciacatechu ...	Do. ...	Khair ...	Do.	
Do. ...	Do. Retusa ...	Do. ...	Kaudla ...	Nirpa.	
Do. ...	Do. Vabbi ...	Large climber ...	Muljan ...	Paur.	
Do. ...	Ougeinia Dalbergi-sides.	Moderate sized tree.	Tinsa ...	Sar ...	Valuable for agricultural implements, carriages, wheels and furniture; takes splendid polish.
Do. ...	Butea Superba ...	Large climber ..	Do. ...	Samar.	
Do. ...	Do. Frondosa ...	Moderate sized tree.	Palas ...	Murra.	
Do. ...	Pterocarpus Marsu-pium.	Large tree ...	Bija Sal ...	Vengur Marra.	Valuable for medicine; gives a stringent "kins" for door and window frames, sleepers, &c.
Do. ...	Dalbergia Paniculata.	Do. ...	Dhobio ...	Padri.	
Do. ...	Cassia Fistula ...	Moderate sized tree.	Amaltas ...	Rera Marra.	
Do. ...	Albizzia Procera ...	Large tree ...	Suffed Siris ...	Passerginui.	
Lythraiceæ ...	Lagerstrœmia Parvi-flora.	Do. ...	Landia ...	Sina.	
Malvasceæ ...	Bombax Malabaricum	Very large tree...	Semal ...	Bargu Marra.	
Meliaceæ ...	Soymida Febrifuga ...	Large tree ...	Rohan ...	Soimi.	
Myrtaceæ ...	Careya Arborea ...	Do. ...	Kumbi ...	Gummar.	
Do. ...	Eugenia Jambolana...	Do. ...	Jamun ...	...	
Oteienæ ...	Schrebera Swieten-oides.	Moderate sized tree.	Moka ...	Mokha Marra.	
Palmeal ...	Phœnix Acaulis ...	Palm ...	Khajur ...	Chind.	
Rhamnaceæ ...	Zizyphus Xylopyra ...	Large shrub ...	Ghoti ...	Do.	
Do. ...	Do. Jujuba ...	Small tree ...	Ber ...	Do.	
Rubiaceæ ...	Stephegyne Parvifolia	Large tree ...	Kaini ...	Chimia Mundi	Valuable for turned and carved articles, furniture, and the like.
Do. ...	Gardenia Latifolia ...	Small tree ...	Gogar ...	Paria Marra.	
Do. ...	Adina Cardifolia ...	Large tree ...	Haldu ...	Uaspu Mundi.	
Do. ...	Gardenia Turgida ...	Small tree ...	Panjra ...	...	
Do. ...	Morinda Exserta ...	Moderate sized shrub.	Al ...	Ali.	
Rutaceæ ...	Aegle Marmelos ...	Small tree ...	Bael ...	Mahaka Dibur.	
Sapindaceæ ...	Schleichera trijuga ...	Large tree ...	Kosum ...	Pusku ...	Valuable for oil, rice and sugar mills, also agricultural implements and carts, fruit cutter(?)
Sapotaceæ ...	Bassia Latifolia ...	Do. ...	Mohwa ...	Irku Marra.	Valuable flower, important article of wood.
Samydaceæ ...	Casearia Tomentosa...	Small tree ...	Buiri ...	Jbundri.	
Do. ...	Do. Graveolens.	Do. ...	Kathera ...	Girchi.	
Sterculiaceæ ...	Eriolaena Hookeriana	Do. ...	Dhamin ...	Kulki.	
Tiliaceæ ...	Grewia Elastica ...	Moderate sized...	Dhamin ...	Kasul.	
Verbenaceæ ...	Tectona Grandis ...	Large tree ...	Segon ...	Do.	

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